ticular tint of colour. The wave-length you see, in the distance from crest to crest of the waves travelling up the long model when I commence giving a simple harmonic oscillation to the lowest bar. I have here a convex lens of very long focus, and a piece of plate glass with its back blackened. When I press the piece of glass against the glass blackened behind, I see coloured rings; the phenomenon will be shown to you on the screen by means of the electric light reflected from the space of air between the two pieces of glass. This phenomenon was first observed by Sir Isaac Newton, and was first explained by the undulatory theory of light. [Newton's rings are now shown on the screen before you by reflected electric light.] If I press the glasses together, you see a dark spot in the centre; the rings appear round it, and there is a dark centre with irregularities. Pressure is required to produce that spot. Why? The answer generally given is, because glass repels glass at a distance of two or three wave-lengths of light; say at a distance of 1/5,000 of a centimetre. I do not believe that for a moment. The seeming repulsion comes from shreds or particles of dust between them. The black spot in the centre is a place where the distance between them is less than a quarter of a wave-length. Now the wave-length for yellow light is about 1/17,000 of a centimetre. The quarter of 1/17,000 is about 1/70,000. The place where you see the middle of that black circle corresponds to air at a distance of less than 1/70,000 of a centimetre. Passing from this black spot to the first ring of maximum light, add half a wave-length to the distance, and we can tell what the distance between the two pieces of glass is at this place; add another half wave-length, and we come to the next maximum of light again; but the colour prevents us speaking very definitely because we have a number of different wave-lengths concerned. I will simplify that by reducing it all to one colour, red, by interposing a red glass. You have now one colour, but much less light altogether, because this glass only lets through homogeneous red light, or not much besides. Now look at what you see on the screen, and you have unmistakable evidence of fulcrums of dust between the glass surfaces. When I put on the screw, I whiten the central black spot by causing the elastic glass to pivot, as it were, round the innumerable little fulcrums constituted by the molecules of dust; and the pieces of glass are pressed not against one another, but against these fulcrums. There are innumerable—say thousands—of little particles of dust jammed between the glass, some of them of perhaps 1/3,000 of a centimetre in diameter, say 5 or 6 wave-lengths. If you lay one piece of glass on another, you think you are pressing glass on glass, but it is nothing of the kind; it is glass on dust. This is a very beautiful phenomenon, and my first object in showing this experiment was simply because it gives us a linear measure bringing us down at once to 1/100,000 of a centimetre.

Now I am just going to enter a very little into detail regarding the reasons that those four lines of argument give us for assigning a limit to the smallness of the molecules of matter. I shall take contact electricity first, and very briefly. If I take these two pieces of zinc and copper and touch them together at the two corners, they become electrified, and attract one another with a perfectly definite force, of which the magnitude is ascertained from absolute measurements in connection with the well-established doctrine of contact electricity. I do not feel it, because the force is very small. You may do the thing in a measured way; you may place a little metallic knob or projection on one of them of 1/100,000 of a centimetre, and lean the other against it. Let there be three such little metal feet put on the copper; let me touch the zinc plate with one of them, and turn it gradually down till it comes to touch the other two. In this position, with an air-space of 1/100,000 of a centimetre between them, there will be positive and negative electricity on the zinc and copper surfaces respectively, of such quantities as to cause a mutual attraction amounting to 2 grammes weight per square centimetre. The amount of work done by the electric attraction upon the plates while they are being allowed to approach one another with metallic connection between them at the corner first touched, till they come to the distance of 1/100,000 of a centimetre, is 2/100,000 of a centimetre-gramme, supposing the area of each plate to be one square centimetre.

(*To be continued.*)

DEATH OF THE PRESIDENT OF THE ROYAL SOCIETY

It is with the profoundest regret that we announce the death of Mr. Spottiswoode, the President of the Royal Society, at 11.15 yesterday morning. The bulletin issued on Tuesday to the effect that although there was no hemorrhage, still that there was no improvement in Mr. Spottiswoode's condition, boded ill because those who knew him best feared that a reserve of strength, which might perhaps have made way against the further progress of the fever through its later stages, was wanting.

As the sad news reaches us just as we are going to press, and as indeed we so recently entered at some considerable length into the lifework of him who is now no more, there is no necessity for us on the present occasion to do more than make the above announcement. This, however, must be said: that there is hardly a man of science in this country, and there are very many in other countries, who will not feel that they have lost a true friend, and one of whose friendship any man might have been proud. There is little doubt too that if he had been more sparing of himself in the various duties which were incumbent upon him as President of the Royal Society, if he had not so freely given all his thoughts and all his exertions to any scientific question which was going on, there might have been more time for relaxation, and there might have been strength to have tided over the illness which has now laid him low.

NOTES

We regret to have to announce the death of General Sir Edward Sabine, K.C.B., which occurred on the 26th inst. at Richmond, where he had been residing for the last twelve months. He was in his ninety-fifth year, having been born October 14, 1788.

At the meeting of the Paris Academy of Sciences on Monday last week the following message concerning the eclipse observations from M. Janssen, dated San Francisco, was read:—"*Janssen*: discovery of the Fraunhofer spectrum and the dark lines of the solar spectrum in the corona, showing cosmical matter around the sun. Large photographs of the corona and the circumsolar regions to a distance of 15°, in search for intra-Mercurial planets. *Palisa* and *Trouvelot*: Exploration of the circumsolar regions; no intra-Mercurial planets found. *Trouvelot*: Sketch of the corona. *Tacchini*: Polarisation of the corona and streamers; spectrum of the streamers, showing analogy with the spectrum of comets; continuous spectrum corona; spectrum of protuberances; plates and drawings of protuberances."

THE American Association for the Advancement of Science will hold its thirty second annual meeting at Minneapolis, Minn., August 15 and following days. The president-elect is Prof. C. A. Young of Princeton, and the following is the list of the sectional vice-presidents of the meeting:—Section A (Mathematics and Astronomy), W. A. Rogers of Cambridge; B (Physics), H. A. Rowland of Baltimore; C (Chemistry), E. W. Morley of Cleveland; D (Mechanical Science), De Volsen Wood of Hoboken; E (Geology and Geography), C. H. Hitchcock of Hanover; F (Biology), W. J. Beal of Lansing; G (Histology and Microscopy), J. D. Cox of Cincinnati; H (Anthropology), O. T. Mason of Washington; I (Economic Science and Statistics), F. B. Hough of Lowville. The permanent secretary is F. W. Putnam of Cambridge; the general secretary (of the meeting), J. R. Eastman of Washington.

THE annual meeting of the American Academy of Arts and Sciences was held in Boston, Tuesday, May 29. The following officers, we learn from *Science*, were elected for the ensuing year:—President, Prof. Joseph Lovering; vice-president, Dr. Oliver Wendell Holmes; corresponding secretary, Prof. Josiah P. Cooke; recording secretary, Prof. John Trowbridge; treasurer, H. P. Kidder; librarian, S. H. Scudder. M. Adolph Wurtz of Paris was elected a foreign honorary member. The list of members of the Academy now includes 192 resident Fellows, 92 associate Fellows, and 72 foreign honorary members. The Academy voted unanimously to confer the Rumford gold medal upon Prof. Henry A. Rowland of Baltimore for his researches in light and heat.

A NEW mode of measuring light was proposed at the last meeting of the Royal Society by Mr. Preece, F.R.S. The standard of reference is a small surface illuminated to a given intensity, and the mode of comparison is the light given by a small glow lamp whose state of incandescence is raised or lowered by increasing or diminishing an electric current. The amount of illumination is measured by the amount of current flowing, so that the number of amperes gives the degree of illumination. The standard surface is that illuminated by a British "candle" at 12·7 inches, and this is the same as that produced by the French "bec" at 1 metre distance. In this way sunlight, moonlight, twilight, fog, and the amount of illumination in any part of a room or building, or that distributed over a street or area at any time of day or night can be measured without any reference to the source of light or its distance from the point lighted. We have in fact a standard of illumination very easily and simply measured.

PROF. BUREAU has been appointed Director of the Jardin des Plantes in place of the late M. Decaisne.

ON Saturday, June 16, a joint meeting of the Essex Field Club and the Geologists' Association was held at Grays for the purpose of visiting the "Deneholes" in Hangman's Wood. From fifty to sixty members and visitors, including many members of the Anthropological Institute, were present, and nearly all had an opportunity of descending one or both of the two holes which were exhibited for the occasion. The meeting was under the conductorship of Mr. T. V. Holmes, F.G.S., who has written a paper giving an account of last year's preliminary exploration, which will shortly appear in the *Transactions of the Essex Field Club*. Photographs of the interior of one of the holes were successfully taken by Mr. A. J. Spiller by means of magnesium burning in oxygen. The party assembled for tea at the "King's Arms" Hotel, when the president of the Club, Prof. G. S. Boulger, and Mr. Holmes announced that it was the intention of the Club to undertake the systematic investigation of these interesting prehistoric remains, both at Grays and elsewhere along the Essex shore of the Thames. A large fund will be required for this work, and a committee has been formed for the purpose of organising the explorations, which will be carried on under the personal superintendence of Mr. T. V. Holmes and Mr. F. C. J. Spurrell. After some remarks by Dr. Hicks, the president of the Geologists' Association, the meeting broke up. A public appeal for assistance will shortly be made, and in the meantime subscriptions will be gladly received by the treasurer of the Essex Field Club, Mr. Andrew Johnston, J.P., The Firs, Woodford, or by the Hon. Secretary, Mr. William Cole, Laurel Cottage, Buckhurst Hill, to be paid to the account of the "Denehole Exploration Fund."

IT will be seen from our Correspondence Columns that an earthquake was felt in the south-west of England on Monday. The shock seems to have spread very widely over Devonshire and East Cornwall. At Holsworthy, Devonshire, a very perceptible shock was felt at seventeen minutes to two o'clock that afternoon. Floors shook, and doors and windows rattled as from a passing train. No damage is reported. A severe shock was felt at Hartland and Clovelly at 1.30 p.m., and a second shock at Clovelly at 1.40. Houses shook considerably, and the bottles on counters in shops were knocked against each other. A similar statement is sent from Bude. The inhabitants of Princetown and the vicinity of Dartmoor, about two o'clock were startled by two smart shocks, followed by a subterranean rumbling like the passing of a very heavy waggon, or the echo of distant thunder. The first trembling was of sufficient intensity to be perceptibly felt by those who happened to be occupying a chair, and the like effect was produced on small movable objects, but it resulted in no mischief. The disturbances apparently travelled from north east to west. At Launceston at twenty minutes to two a shock was felt, accompanied by a rumbling noise, which lasted at intervals during about thirty minutes. The houses shook, and china and earthenware rattled on the shelves. About an hour afterwards another shock was felt, but not so severe. Similar information comes from Lostwithiel, Liskeard, Lydford, Tavistock, Okehampton, and Bideford.

THE Fine Art Society (148, New Bond Street) have sent us an artist's proof of M. Leopold Flameng's very fine etching after Mr. John Collier's picture of the late Mr. Darwin. The original is admittedly faithful and characteristic, and of high rank as a work of art, and M. Flameng has been perfectly successful in reproducing the artist's intention. The result of both these labours is a portrait of the greatest man of science of this century, which all other men of science should be glad to possess. We believe the number printed is limited. M. Flameng will also undertake a similar etching of Mr. Collier's picture of Prof. Huxley in this year's Exhibition.

WE have received the Report of the Royal Victoria Coffee Hall, where, as may be known to many of our readers, much good work is being done at the present time in the way of providing cheap amusement every night, free from the temptation to drink and other evils common to ordinary music halls. Among other experiments being tried are short lectures of the simplest and most popular kind, generally on some scientific subject illustrated by the oxyhydrogen lantern. We are told that a really good lecturer who understands his audience as well as his subject meets with a most encouraging reception, but that very few men of science give their assistance in this good work. We regret this; but we believe it is largely due to the fact that very little is known of the work in question, and that if a general appeal were made to those men of science who occasionally give an account either of their own work or the work of others, many would be found willing to join in the effort which is now being made to interest the working classes in science in what was formerly the Royal Victoria Theatre.

OUR Paris Correspondent writes:—An interesting experiment took place on June 24, at the early hour of 3.45 in Paris, for the purpose of testing the capacity of accumulators of the French Storage Company to move tramcars. We travelled up to La Muette and back, a distance of 30 kilometres, in about three hours and twenty minutes, including stoppages and loss of time incurred by several incidents. The road has many steep inclines, which were ascended without difficulty. The mean velocity exceeded 10 kilometres per hour. The electricity was supplied by seventy accumulators, weighing 30 kilograms each, which were placed under the seats. At starting the potential was 140 volts, and having completed its task the current was as high as 126, so that at least 10 kilometres more could have been run if deemed necessary. This run is the longest on record made by electricity. M. Philippart was directing the operations.

THE Balloon Exhibition was closed at the Trocadéro on the 24th inst. It was visited by two officers of the British army, sent by the Government to report. Among the notable objects we may mention the original valve used by Gay-Lussac in his ascent, a new valve used by French aëronauts, the car and net of Lhoste as rescued from the North Sea, a panoramic apparatus for photographing a bird's-eye view of scenery as seen from a balloon at an altitude of 200 metres, several photographs taken from the cars of captive or free balloons in Paris, Boston, and Rouen, a refrigerator by Mignon and Bouard for instantly condensing vapour from clouds, bichromate elements constructed by Trouvé for Tissandier's intended aërial experiments.

THE following are the details of the method by which the fairy-like illuminations at Moscow at the coronation were produced:—The Tower of Ivan the Great and its side galleries were lit up by 3,500 small Edison lamps, fed by eighteen portable engines, which moved a number of dynamo-electric machines of every existing system. The portable engines and machines were kept at the other bank of the Moskwa. The sheds communicated with the tower by seventy aërial electric wires. On the ramparts of the Kremlin towards the river eight large and ten smaller electric suns threw their light over the river. The rest of the illuminations consisted of 200,000 lamps and 30,000 coloured glass globes, 50,000 lanterns of Venetian glass, 600,000 tapers, and 10,800 lb. of fireworks.

THE National Museum at Washington is one of the best examples in the United States of the practical application of electricity. In so large a building it was found advisable to take advantage of the best means of communication, first being its system of telephones and call-bells, by which those in any room can communicate with every room in the building. Twenty-six telephones are connected by a local telephone exchange, which in turn is connected with the main telephone office of the city. The result is that but three messengers are needed in this vast establishment. The photographic laboratory is independent of the sun, owing to the electric light there used. If one of the 850 windows or 230 doors is opened, a bell rings, and an electric annunciator shows to an attendant at the main office which window or door it is. This system is soon to be applied to every case of specimens. The watchmen at night, also, are kept to their posts by hourly releasing an electric current at certain stations, which pierces a dial and records their visit. The sixteen clock dials are likewise run by electric currents.

A MONUMENT to the memory of the celebrated naturalist, Lorenz Oken, will be unveiled at Offenburg on August 1 next. It will be in the shape of a fountain crowned with a marble bust of Oken.

MESSRS. GRIFFITH AND FARRAN have issued a new and cheaper edition of Mrs. Lankester's "Talks about Plants; or Early Lessons in Botany," first published in 1878.

PRINCE LUDWIG FERDINAND of Bavaria, an indefatigable worker in the domain of comparative anatomy, is about to publish a monograph on the tongue. Riedel (Munich) will be the publisher.

A MAGNIFICENT meteor was observed at Giesshübl, near Mödling (Vienna), on June 3, at 9.44 p.m. It seemed to consist of two fireballs, an emerald green one followed by a red one. They both moved apparently at a not very great altitude in the direction south-east to north west. The phenomenon lasted for three seconds. It is remarkable that the meteor seen at the same place on the evening of March 13, moved in almost exactly the same direction. Also at Gau-Algesheim (near Mainz) a fine meteor was seen in the northern sky on the evening of June 3; it left a most vivid trail behind, which shone for some time along the whole extent of its path.

A WRITER in the *North China Herald* gives some curious information respecting the foot-measure in China. At present it varies largely in different parts of the country and according to different trades; thus the foot of the carpenter's rule at Ningpo is less than ten, while that of the junk-builders at Shanghai is nearly sixteen, inches. But a medium value of twelve inches is not uncommon. The standard foot of the Imperial Board of Works at Peking is twelve and a half inches. A copper foot-measure, dated A.D. 81, is still preserved, and is nine and a half inches in length. The width is one inch. The small copper coins, commonly called *cash*, were made of such a size, sometimes, as just to cover an inch on the foot-rule. In the course of two centuries it was found that the foot had increased half an inch, and a difference in the dimensions of musical instruments resulted. Want of harmony was the consequence, and accordingly in A.D. 274 a new measure, exactly nine inches in length, was made the standard. Among the means employed for comparing the old and new foot are mentioned the gnomon of official sundials, and the length of certain jade tubes used according to old regulations as standards. One of these latter was so adjusted that an inch in breadth was equal to the breadth of ten millet seeds. A hundred millet seeds, or ten inches, was the foot. The Chinese foot is really based on the human hand, as is the European foot upon the foot. It strikes the Chinese as very incongruous when they hear that we measure cloth, woodwork, masonry, &c., which they regard as especially matters for the hand, by the foot. Of the jade tubes above mentioned there were twelve, and these formed the basis for the measurement of liquids and solids four thousand years ago. They are mentioned in the oldest Chinese documents with the astrolabe, the cycle of sixty years, and several of the oldest constellations. It is likely that they will be found to be an importation from Babylon, and in that case the Chinese foot is based on a Babylonian measure of a span, and should be nine inches in length.

MR. CHAS. G. LELAND, the writer of No. 4 (1882) of the "Circulars of Information" of the United States Bureau of Education, on the subject of Industrial Art in Schools, after premising that ornamental art is innate in man, and indeed is developed in a race before it attains proficiency in the useful, and remarking that the brains of the Parisians of the thirteenth century, when Gothic art adorned every object, were much smaller than they are now, draws the conclusion that children are more open to art education than to technical training. He finds the sexes equal in ability; urges outline drawing and monochrome as the foundation of further work; recommends the use of various mechanical helps, as of compasses and stencilling as actual incentives to freehand drawing; urges the practice of freehand from the shoulder, even in the variety of drawing called writing; and gives a wonderful list of artistic effects which pupils who have had only short instruction in these arts are competent to produce. Education of this sort is valuable as simply affording healthy occupation of body and mind to some classes; it opens the eyes of the mind, which will tend to make work popular instead of idleness. He teaches that nothing made by machinery can be artistic; physical comforts may be supplied by it, but works of taste and refinement must be hand-made, and among the poorer classes should be the produce of home art, like the carved oak of Ann Hathaway's cottage. Mr. Leland was one of the first to point out that the decay of the apprentice system must soon necessitate industrial education, and he has prepared a series of cheap art-work manuals on decorative design, ceramic or porcelain painting, tapestry or dye-painting, outline and filled-in embroidery, decorative oil-painting, wood-carving, *repoussé* or sheet-brass work, leather work, papier mâché, modelling in clay, with underglaze faïence decoration, and stencilling.—No. 5 of the "Circulars" is on the subject of Maternal Schools in France, which answer to our Infant Schools. The value of them as laying the foundations of education is urged by the Commissioners. Excellent suggestions for object lessons, whose subjects are supplied by the season of the year, and also for the arrangement of school buildings are given. The result of such schools should be a slight training of the senses by object-lessons; the beginnings of habits and dispositions favourable to future education; a taste for gymnastics, for singing, and for drawing; an eagerness to listen, observe, question, and answer; the power of attention; a generally quickened intelligence, and a mind open to receive good moral influences. In other words, education is a "bringing forth" of the powers of the mind, and not a making it a live cyclopædia. No. 6 is a full copy, with a few useful notes for comparison, of the English Report of the Royal Commission on Technical Education in France, presented by Mr. Samuelson and his coadjutors in February, 1882.

WITH the May number the *Journal of Forestry* changed both its title and the colour and design of its cover, and it now appears under the simple name of *Forestry*. It is an acknowledged fact that changes of this character are generally inadvisable in a journal of long-established reputation, but under the editorship of Mr. Francis George Heath we have no doubt that *Forestry* will at least maintain the reputation and circulation it had attained under its old management, if it does not increase them, which indeed it is most likely to do. The May number opens with an editorial note entitled "A May Note," in which the glories of spring and summer in woodland glades and forest are set forth. Then Mr. R. D. Blackmore gives us "A Cuckoo Song." Amongst other readable articles may be mentioned "Lord Somerville; a forgotten President of Agriculture," by Mr. R. A. Kinglake; Mr. Boulger's "Beauties of British Trees," and Mr. Guillemard's "Forest Ramble in New South Wales." In the June number the same amount of interest and variety is maintained. Mr. Guillemard gives "A Forest Ramble in Norway." The article on "Epping Forest and its Future Management" will however, we have no doubt, be read by most readers, as any one having the slightest inclination towards any branch of natural history cannot fail to be interested in maintaining the Forest in all its native beauty, and if *Forestry* is able by its advocacy, backed up by the opinions of those who are now taking a lead in the matter, to stem the tide of improvements so-called in Epping Forest, it will have fulfilled a work for which thousands will be thankful.

THE additions to the Zoological Society's Gardens during the past week include a Crab-eating Raccoon (*Procyon cancrivorus* ♂) from Brazil, presented by Mr. Theo. Walsh; a Ring-tailed Coati (*Nasua rufa* ♂) from Brazil, presented by Mr. R. G. Hamilton; two Common Hedgehogs (*Erinaceus europæus*), British, presented by Mr. S. Mummery; four Restless Cavies (*Cavia caprera*) from Brazil, presented by Mr. E. H. Draper; a Ring-necked Parrakeet (*Palæornis torquatus*) from India, presented by Mr. W. Quail; two Common Kingfishers (*Alcedo ispida*), British, presented by Mr. T. E. Gunn; three Common Vipers (*Vipera berus*), British, presented by Mr. C. Taylor; two Common Snakes (*Tropidonotus natrix*), European, presented by Lord Arthur Russell, F.Z.S.; a Puma (*Felis concolor* ♀) from South America, a Goffin's Cockatoo (*Cacatua goffini*) from Queensland, deposited; two West African Love Birds (*Agapornis pullaria*) from West Africa, an Indian Python (*Python molurus*) from India, purchased; two Vulpine Phalangers (*Phalangista vulpina*), eight Gold Pheasants (*Thaumalea picta*), six Prairie Grouse (*Tetrao cupido*), a Herring Gull (*Larus argentatus*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

THE NEXT TOTAL SOLAR ECLIPSE.—In NATURE, vol. xiv. p. 450, we gave some results of an approximate calculation of the total eclipse of the sun on September 8–9, 1885, wherein the central line traverses New Zealand, but does not encounter land in any other part of its course. The correction required to the moon's place there employed is sufficiently important to render a new calculation of interest, and we shall accordingly present here some of the circumstances of the eclipse, resulting from the substitution of the lunar places in the *Nautical Almanac*, which are founded upon Hansen's Tables, with Prof. Newcomb's corrections. The elements of the eclipse as given in the ephemeris are employed, excepting that in place of Hansen's semidiameter of the moon, we infer the semidiameter from the ratio, 0 2725 of the horizontal parallax.

At a point in longitude 11h. 40m. 0s. E. of Greenwich, with 40° 49′·4 south latitude (nearly on the central line) the total eclipse begins, September 9, at 7h. 44m. 9s. local mean time, and continues 1m. 51s., and this will be about the longest duration of totality available for observation upon land in this eclipse. For any place near the above point, the Greenwich mean times of beginning and ending of totality may be obtained from the following formulæ:—

$$\text{Cos. } w = -116{\cdot}3108 - [2{\cdot}10869]\text{ sin. } l + [1{\cdot}64777]\text{ cos. } l\text{ cos. }(L - 161^\circ\ 16'{\cdot}5)$$

$$t = 8\text{h. } 58\text{m. } 21{\cdot}1\text{s. } \mp [1{\cdot}74578]\text{ sin. } w - [3{\cdot}37987]\text{ sin. } l$$
$$- [3{\cdot}85619]\text{ cos. } l\text{ cos. }(L - 145^\circ\ 49'{\cdot}6).$$

Here L is the longitude from Greenwich, reckoned *positive*, and *l* the geocentric latitude, which may be deduced from Mr. Stone's valuable table in the *Monthly Notices of the Royal Astronomical Society* for January last, a table it might have been worth while to publish separately. The quantities in square brackets are logarithms.

As one result of the introduction of the more accurate place of the moon, it is found that the central line approaches much nearer to Wellington; a direct calculation for that place shows that the total eclipse begins there at 7h. 44m. 23s. a.m., and ends at 7h. 45m. 46s. local mean time, thus continuing 1m. 23s., and the same figures are given by the above equations. At Nelson totality commences at 7h. 37m. 16s. a.m. local mean time, and continues 1m. 3s.

It may be noted that during the totality of this eclipse the planet Jupiter will be situated only 45′ from the sun's limb, on an angle of about 26° with the circle of declination at his centre.

THE ANNULAR SOLAR ECLIPSE OF OCTOBER 31, 1883.—In May last we had a case where the track of a total eclipse of the sun was almost wholly an ocean-track, and where it was consequently necessary to send expeditions to the Mid-Pacific, to obtain observations. The annular eclipse in October next is similarly circumstanced; excepting possibly one or two mere rocks in the Pacific, it will not be observable on land, elsewhere than on the island of Niphon, Japan. If we calculate from the *Nautical Almanac* elements for longitude 9h. 20m. 48s. E. and latitude 38° 11′ N., we find the annular phase commences at 7h. 28m. 2s. a.m., and ends at 7h. 35m. 23s., a duration of 7m. 21s., and the sun will be at an altitude of about 12°. At the capital, Tokio, the eclipse will not be annular; the greatest phase is at 7h. 28m. a.m., magnitude 0·88 (the sun's diameter being taken as unity).